

WMT 2018

**Third Conference on
Machine Translation**

Proceedings of the Conference

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Introduction

The Third Conference on Machine Translation (WMT 2018) took place on Wednesday, October 31 and Thursday, November 1, 2018 in Brussels, Belgium, immediately preceding the Conference on Empirical Methods in Natural Language Processing (EMNLP 2018).

This is the third time WMT has been held as a conference. The first time WMT was held as a conference was at ACL 2016 in Berlin, Germany, and the second time was at EMNLP 2017 in Copenhagen, Denmark. Prior to being a conference, WMT was held 10 times as a workshop. WMT was held for the first time at HLT-NAACL 2006 in New York City, USA. In the following years the Workshop on Statistical Machine Translation was held at ACL 2007 in Prague, Czech Republic, ACL 2008, Columbus, Ohio, USA, EACL 2009 in Athens, Greece, ACL 2010 in Uppsala, Sweden, EMNLP 2011 in Edinburgh, Scotland, NAACL 2012 in Montreal, Canada, ACL 2013 in Sofia, Bulgaria, ACL 2014 in Baltimore, USA, and EMNLP 2015 in Lisbon, Portugal.

The focus of our conference is to bring together researchers from the area of machine translation and invite selected research papers to be presented at the conference.

Prior to the conference, in addition to soliciting relevant papers for review and possible presentation, we conducted 8 shared tasks. This consisted of three translation tasks: Machine Translation of News, Biomedical Translation, and Multimodal Machine Translation, two evaluation tasks: Metrics and Quality Estimation, as well as the Automatic Post-Editing and Parallel Corpus Filtering tasks. The Parallel Corpus Filtering tasks was run at this year's edition of WMT for the first time. As almost all machine translation system require parallel corpora to train their models, the size and quality of available parallel corpora has a substantial impact on machine translation quality. At the same, sizable, high-quality parallel corpora are not available for many languages. This task addresses the important issue of how to exploit noisy parallel corpora, which are available in much larger quantities and for a larger number of languages.

The results of all shared tasks were announced at the conference, and these proceedings also include overview papers for the shared tasks, summarizing the results, as well as providing information about the data used and any procedures that were followed in conducting or scoring the tasks. In addition, there are short papers from each participating team that describe their underlying system in greater detail.

Like in previous years, we have received a far larger number of submissions than we could accept for presentation. WMT 2018 has received 84 full research paper submissions (not counting withdrawn submissions). This is a record number of research paper submissions and more than double the number of submissions of earlier editions of WMT. In total, WMT 2018 featured 27 full research paper presentations (32% acceptance rate) and 82 shared task poster presentations.

We would like to thank the members of the Program Committee for their timely reviews. We also would like to thank the participants of the shared task and all the other volunteers who helped with the evaluations.

Ondřej Bojar, Rajen Chatterjee, Christian Federmann, Mark Fishel, Yvette Graham, Barry Haddow, Matthias Huck, Antonio Jimeno Yepes, Philipp Koehn, Christof Monz, Matteo Negri, Aurélie Névól, Mariana Neves, Matt Post, Lucia Specia, Marco Turchi, and Karin Verspoor

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Conference Program

Wednesday, October 31, 2018

8:45–9:00 Opening Remarks

9:00–10:30 Session 1: Shared Tasks Overview Presentations I

9:00–9:30 *Findings of the 2018 Conference on Machine Translation (WMT18)*
Ondřej Bojar, Christian Federmann, Mark Fishel, Yvette Graham, Barry Haddow, Matthias Huck, Philipp Koehn and Christof Monz

9:30–9:50 *Findings of the Third Shared Task on Multimodal Machine Translation*
Loïc Barrault, Fethi Bougares, Lucia Specia, Chiraag Lala, Desmond Elliott and Stella Frank

9:50–10:10 *Findings of the WMT 2018 Biomedical Translation Shared Task: Evaluation on Medline test sets*
Mariana Neves, Antonio Jimeno Yepes, Aurélie Névéal, Cristian Grozea, Amy Siu, Madeleine Kittner and Karin Verspoor

Booster Session for Research Papers Presented as Posters

10:16–10:18 *Scaling Neural Machine Translation*
Myle Ott, Sergey Edunov, David Grangier and Michael Auli

10:18–10:20 *Character-level Chinese-English Translation through ASCII Encoding*
Nikola Nikolov, Yuhuang Hu, Mi Xue Tan and Richard H.R. Hahnloser

10:20–10:22 *Neural Machine Translation of Logographic Language Using Sub-character Level Information*
Longtu Zhang and Mamoru Komachi

10:22–10:24 *An Analysis of Attention Mechanisms: The Case of Word Sense Disambiguation in Neural Machine Translation*
Gongbo Tang, Rico Sennrich and Joakim Nivre

10:24–10:26 *Discourse-Related Language Contrasts in English-Croatian Human and Machine Translation*
Margita Šoštarić, Christian Hardmeier and Sara Stymne

10:26–10:28 *Coreference and Coherence in Neural Machine Translation: A Study Using Oracle Experiments*
Dario Stojanovski and Alexander Fraser

10:28–10:30 *A Large-Scale Test Set for the Evaluation of Context-Aware Pronoun Translation in Neural Machine Translation*
Mathias Müller, Annette Rios, Elena Voita and Rico Sennrich

Wednesday, October 31, 2018 (continued)

10:30-11:00 Coffee Break

11:00–12:30 Session 2: Poster Session I

11:00–12:30 Shared Task: News Translation

An Empirical Study of Machine Translation for the Shared Task of WMT18

Chao Bei, Hao Zong, Yiming Wang, Baoyong Fan, Shiqi Li and Conghu Yuan

Robust parafda Statistical Machine Translation Results

Ergun Biçici

The TALP-UPC Machine Translation Systems for WMT18 News Shared Translation Task

Noe Casas, Carlos Escolano, Marta R. Costa-jussà and José A. R. Fonollosa

Phrase-based Unsupervised Machine Translation with Compositional Phrase Embeddings

Maksym Del, Andre Tättar and Mark Fishel

Alibaba's Neural Machine Translation Systems for WMT18

Yongchao Deng, Shanbo Cheng, Jun Lu, Kai Song, Jingang Wang, Shenglan Wu, Liang Yao, Guchun Zhang, Haibo Zhang, Pei Zhang, Changfeng Zhu and Boxing Chen

The RWTH Aachen University English-German and German-English Unsupervised Neural Machine Translation Systems for WMT 2018

Miguel Graça, Yunsu Kim, Julian Schamper, Jiahui Geng and Hermann Ney

Cognate-aware morphological segmentation for multilingual neural translation

Stig-Arne Grönroos, Sami Virpioja and Mikko Kurimo

The AFRL WMT18 Systems: Ensembling, Continuation and Combination

Jeremy Gwinnup, Tim Anderson, Grant Erdmann and Katherine Young

The University of Edinburgh's Submissions to the WMT18 News Translation Task

Barry Haddow, Nikolay Bogoychev, Denis Emelin, Ulrich Germann, Roman Grundkiewicz, Kenneth Heafield, Antonio Valerio Miceli Barone and Rico Sennrich

TencentFmRD Neural Machine Translation for WMT18

Bojie Hu, Ambyer Han and Shen Huang

Wednesday, October 31, 2018 (continued)

The MLLP-UPV German-English Machine Translation System for WMT18

Javier Iranzo-Sánchez, Pau Baquero-Arnal, Gonçal V. Garcés Díaz-Munío, Adrià Martínez-Villaronga, Jorge Civera and Alfons Juan

Microsoft's Submission to the WMT2018 News Translation Task: How I Learned to Stop Worrying and Love the Data

Marcin Junczys-Dowmunt

CUNI Submissions in WMT18

Tom Kocmi, Roman Sudarikov and Ondřej Bojar

The JHU Machine Translation Systems for WMT 2018

Philipp Koehn, Kevin Duh and Brian Thompson

JUCBNMT at WMT2018 News Translation Task: Character Based Neural Machine Translation of Finnish to English

Sainik Kumar Mahata, Dipankar Das and Sivaji Bandyopadhyay

NICT's Neural and Statistical Machine Translation Systems for the WMT18 News Translation Task

Benjamin Marie, Rui Wang, Atsushi Fujita, Masao Utiyama and Eiichiro Sumita

PROMT Systems for WMT 2018 Shared Translation Task

Alexander Molchanov

NTT's Neural Machine Translation Systems for WMT 2018

Makoto Morishita, Jun Suzuki and Masaaki Nagata

The Karlsruhe Institute of Technology Systems for the News Translation Task in WMT 2018

Ngoc-Quan Pham, Jan Niehues and Alexander Waibel

Tilde's Machine Translation Systems for WMT 2018

Marcis Pinnis, Matiss Rikters and Rihards Krišlauks

CUNI Transformer Neural MT System for WMT18

Martin Popel

The University of Helsinki submissions to the WMT18 news task

Alessandro Raganato, Yves Scherrer, Tommi Nieminen, Arvi Hurskainen and Jörg Tiedemann

Wednesday, October 31, 2018 (continued)

The RWTH Aachen University Supervised Machine Translation Systems for WMT 2018

Julian Schamper, Jan Rosendahl, Parnia Bahar, Yunsu Kim, Arne Nix and Hermann Ney

The University of Cambridge's Machine Translation Systems for WMT18

Felix Stahlberg, Adrià de Gispert and Bill Byrne

The LMU Munich Unsupervised Machine Translation Systems

Dario Stojanovski, Viktor Hangya, Matthias Huck and Alexander Fraser

Tencent Neural Machine Translation Systems for WMT18

Mingxuan Wang, Li Gong, Wenhuan Zhu, Jun Xie and Chao Bian

The NiuTrans Machine Translation System for WMT18

Qiang Wang, Bei Li, Jiqiang Liu, Bojian Jiang, Zheyang Zhang, Yinqiao Li, Ye Lin, Tong Xiao and Jingbo Zhu

The University of Maryland's Chinese-English Neural Machine Translation Systems at WMT18

Weijia Xu and Marine Carpuat

11:00–12:30 Extra Test Suites

EvalD Reference-Less Discourse Evaluation for WMT18

Ondřej Bojar, Jiří Mírovský, Kateřina Rysová and Magdaléna Rysová

The WMT'18 Morpheval test suites for English-Czech, English-German, English-Finnish and Turkish-English

Franck Burlot, Yves Scherrer, Vinit Ravishankar, Ondřej Bojar, Stig-Arne Grönroos, Maarit Koponen, Tommi Nieminen and François Yvon

Testsuite on Czech–English Grammatical Contrasts

Silvie Cinkova and Ondřej Bojar

A Pronoun Test Suite Evaluation of the English–German MT Systems at WMT 2018

Liane Guillou, Christian Hardmeier, Ekaterina Lapshinova-Koltunski and Sharid Loáiciga

Fine-grained evaluation of German-English Machine Translation based on a Test Suite

Vivien Macketanz, Eleftherios Avramidis, Aljoscha Burchardt and Hans Uszkoreit

The Word Sense Disambiguation Test Suite at WMT18

Annette Rios, Mathias Müller and Rico Sennrich

Wednesday, October 31, 2018 (continued)

11:00–12:30 Shared Task: Multimodal Translation

LIUM-CVC Submissions for WMT18 Multimodal Translation Task

Ozan Caglayan, Adrien Bardet, Fethi Bougares, Loïc Barrault, Kai Wang, Marc Masana, Luis Herranz and Joost van de Weijer

The MeMAD Submission to the WMT18 Multimodal Translation Task

Stig-Arne Grönroos, Benoit Huet, Mikko Kurimo, Jorma Laaksonen, Bernard Merialdo, Phu Pham, Mats Sjöberg, Umut Sulubacak, Jörg Tiedemann, Raphael Troncy and Raúl Vázquez

The AFRL-Ohio State WMT18 Multimodal System: Combining Visual with Traditional

Jeremy Gwinnup, Joshua Sandvick, Michael Hutt, Grant Erdmann, John Duseles and James Davis

CUNI System for the WMT18 Multimodal Translation Task

Jindřich Helcl, Jindřich Libovický and Dusan Varis

Sheffield Submissions for WMT18 Multimodal Translation Shared Task

Chiraag Lala, Pranava Swaroop Madhyastha, Carolina Scarton and Lucia Specia

Ensemble Sequence Level Training for Multimodal MT: OSU-Baidu WMT18 Multimodal Machine Translation System Report

Renjie Zheng, Yilin Yang, Mingbo Ma and Liang Huang

UMONS Submission for WMT18 Multimodal Translation Task

Jean-Benoit Delbrouck and Stéphane Dupont

11:00–12:30 Shared Task: Biomedical Translation

Translation of Biomedical Documents with Focus on Spanish-English

Mirela-Stefania Duma and Wolfgang Menzel

Ensemble of Translators with Automatic Selection of the Best Translation

– the submission of FOKUS to the WMT 18 biomedical translation task –
Cristian Grozea

LMU Munich's Neural Machine Translation Systems at WMT 2018

Matthias Huck, Dario Stojanovski, Viktor Hangya and Alexander Fraser

Hunter NMT System for WMT18 Biomedical Translation Task: Transfer Learning in Neural Machine Translation

Abdul Khan, Subhadarshi Panda, Jia Xu and Lampros Flokas

Wednesday, October 31, 2018 (continued)

UFRGS Participation on the WMT Biomedical Translation Shared Task

Felipe Soares and Karin Becker

Neural Machine Translation with the Transformer and Multi-Source Romance Languages for the Biomedical WMT 2018 task

Brian Tubay and Marta R. Costa-jussà

12:30–14:00 Lunch

14:00–15:20 Session 3: Research Papers on Embedding and Context

14:00–14:20 *Beyond Weight Tying: Learning Joint Input-Output Embeddings for Neural Machine Translation*

Nikolaos Pappas, Lesly Miculicich and James Henderson

14:20–14:40 *A neural interlingua for multilingual machine translation*

Yichao Lu, Phillip Keung, Faisal Ladhak, Vikas Bhardwaj, Shaonan Zhang and Jason Sun

14:40–15:00 *Improving Neural Language Models with Weight Norm Initialization and Regularization*

Christian Herold, Yingbo Gao and Hermann Ney

15:00–15:20 *Contextual Neural Model for Translating Bilingual Multi-Speaker Conversations*

Sameen Maruf, André F. T. Martins and Gholamreza Haffari

15:30–16:00 Coffee Break

16:00–17:20 Session 4: Research Papers on Analysis and Data

16:00–16:20 *Attaining the Unattainable? Reassessing Claims of Human Parity in Neural Machine Translation*

Antonio Toral, Sheila Castilho, Ke Hu and Andy Way

16:20–16:40 *Freezing Subnetworks to Analyze Domain Adaptation in Neural Machine Translation*

Brian Thompson, Huda Khayrallah, Antonios Anastasopoulos, Arya D. McCarthy, Kevin Duh, Rebecca Marvin, Paul McNamee, Jeremy Gwinnup, Tim Anderson and Philipp Koehn

16:40–17:00 *Denoising Neural Machine Translation Training with Trusted Data and Online Data Selection*

Wei Wang, Taro Watanabe, Macduff Hughes, Tetsuji Nakagawa and Ciprian Chelba

17:00–17:20 *Using Monolingual Data in Neural Machine Translation: a Systematic Study*

Franck Burlot and François Yvon

Thursday, November 1, 2018

9:00–10:30 Session 5: Shared Tasks Overview Presentations I

- 9:00–9:20 *Results of the WMT18 Metrics Shared Task: Both characters and embeddings achieve good performance*
Qingsong Ma, Ondřej Bojar and Yvette Graham
- 9:20–9:40 *Findings of the WMT 2018 Shared Task on Quality Estimation*
Lucia Specia, Frédéric Blain, Varvara Logacheva, Ramón Astudillo and André F. T. Martins
- 9:40–9:55 *Findings of the WMT 2018 Shared Task on Automatic Post-Editing*
Rajen Chatterjee, Matteo Negri, Raphael Rubino and Marco Turchi
- 9:55–10:10 *Findings of the WMT 2018 Shared Task on Parallel Corpus Filtering*
Philipp Koehn, Huda Khayrallah, Kenneth Heafield and Mikel L. Forcada

Boaster Session for Research Papers Presented as Posters

- 10:14–10:16 *Neural Machine Translation into Language Varieties*
Surafel Melaku Lakew, Aliia Erofeeva and Marcello Federico
- 10:16–10:18 *Effective Parallel Corpus Mining using Bilingual Sentence Embeddings*
Mandy Guo, Qinlan Shen, Yinfei Yang, Heming Ge, Daniel Cer, Gustavo Hernandez Abrego, Keith Stevens, Noah Constant, Yun-hsuan Sung, Brian Strope and Ray Kurzweil
- 10:18–10:20 *On The Alignment Problem In Multi-Head Attention-Based Neural Machine Translation*
Tamer Alkhouli, Gabriel Bretschner and Hermann Ney
- 10:20–10:22 *A Call for Clarity in Reporting BLEU Scores*
Matt Post
- 10:22–10:24 *Exploring gap filling as a cheaper alternative to reading comprehension questionnaires when evaluating machine translation for gisting*
Mikel L. Forcada, Carolina Scarton, Lucia Specia, Barry Haddow and Alexandra Birch
- 10:24–10:26 *Simple Fusion: Return of the Language Model*
Felix Stahlberg, James Cross and Veselin Stoyanov

Thursday, November 1, 2018 (continued)

10:26–10:28 *Correcting Length Bias in Neural Machine Translation*
Kenton Murray and David Chiang

10:28–10:30 *Extracting In-domain Training Corpora for Neural Machine Translation Using Data Selection Methods*
Catarina Cruz Silva, Chao-Hong Liu, Alberto Poncelas and Andy Way

10:30–11:00 Coffee Break

11:00–12:30 Session 6: Poster Session II

11:00–12:30 Shared Task: Metrics

Meteor++: Incorporating Copy Knowledge into Machine Translation Evaluation
Yinuo Guo, Chong Ruan and Junfeng Hu

ITER: Improving Translation Edit Rate through Optimizable Edit Costs
Joybrata Panja and Sudip Kumar Naskar

RUSE: Regressor Using Sentence Embeddings for Automatic Machine Translation Evaluation
Hiroki Shimanaka, Tomoyuki Kajiwara and Mamoru Komachi

11:00–12:30 Shared Task: Quality Estimation

Keep It or Not: Word Level Quality Estimation for Post-Editing
Prasenjit Basu, Santanu Pal and Sudip Kumar Naskar

RTM results for Predicting Translation Performance
Ergun Biçici

Neural Machine Translation for English-Tamil
Himanshu Choudhary, Aditya Kumar Pathak, Rajiv Ratan Saha and Ponnurangam Kumaraguru

The Benefit of Pseudo-Reference Translations in Quality Estimation of MT Output
Melania Duma and Wolfgang Menzel

Supervised and Unsupervised Minimalist Quality Estimators: Vicomtech's Participation in the WMT 2018 Quality Estimation Task
Thierry Etchegoyhen, Eva Martínez Garcia and Andoni Azpeitia

Thursday, November 1, 2018 (continued)

Contextual Encoding for Translation Quality Estimation

Junjie Hu, Wei-Cheng Chang, Yuexin Wu and Graham Neubig

Sheffield Submissions for the WMT18 Quality Estimation Shared Task

Julia Ive, Carolina Scarton, Frédéric Blain and Lucia Specia

UAlacant machine translation quality estimation at WMT 2018: a simple approach using phrase tables and feed-forward neural networks

Felipe Sánchez-Martínez, Miquel Esplà-Gomis and Mikel L. Forcada

Alibaba Submission for WMT18 Quality Estimation Task

Jiayi Wang, Kai Fan, Bo Li, Fengming Zhou, Boxing Chen, Yangbin Shi and Luo Si

Quality Estimation with Force-Decoded Attention and Cross-lingual Embeddings

Elizaveta Yankovskaya, Andre Tättar and Mark Fishel

11:00–12:30 Shared Task: Automatic Post-Editing

MS-UEdin Submission to the WMT2018 APE Shared Task:

Dual-Source Transformer for Automatic Post-Editing

Marcin Junczys-Dowmunt and Roman Grundkiewicz

A Transformer-Based Multi-Source Automatic Post-Editing System

Santanu Pal, Nico Herbig, Antonio Krüger and Josef van Genabith

DFKI-MLT System Description for the WMT18 Automatic Post-editing Task

Daria Pylypenko and Raphael Rubino

Multi-encoder Transformer Network for Automatic Post-Editing

Jaehun Shin and Jong-Hyeok Lee

Multi-source transformer with combined losses for automatic post editing

Amirhossein Tebbifakhr, Ruchit Agrawal, Rajen Chatterjee, Matteo Negri and Marco Turchi

11:00–12:30 Shared Task: Parallel Corpus Filtering

The Speechmatics Parallel Corpus Filtering System for WMT18

Tom Ash, Remi Francis and Will Williams

Thursday, November 1, 2018 (continued)

STACC, OOV Density and N-gram Saturation: Vicomtech's Participation in the WMT 2018 Shared Task on Parallel Corpus Filtering

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A hybrid pipeline of rules and machine learning to filter web-crawled parallel corpora

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Viktor Hangya and Alexander Fraser

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Marcin Junczys-Dowmunt

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Huda Khayrallah, Hainan Xu and Philipp Koehn

Measuring sentence parallelism using Mahalanobis distances: The NRC unsupervised submissions to the WMT18 Parallel Corpus Filtering shared task

Patrick Littell, Samuel Larkin, Darlene Stewart, Michel Simard, Cyril Goutte and Chi-kiu Lo

Accurate semantic textual similarity for cleaning noisy parallel corpora using semantic machine translation evaluation metric: The NRC supervised submissions to the Parallel Corpus Filtering task

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Gustavo Paetzold

The ILSP/ARC submission to the WMT 2018 Parallel Corpus Filtering Shared Task

Vassilis Papavassiliou, Sokratis Sofianopoulos, Prokopis Prokopidis and Stelios Piperidis

Thursday, November 1, 2018 (continued)

SYSTRAN Participation to the WMT2018 Shared Task on Parallel Corpus Filtering
Minh Quang Pham, Josep Crego and Jean Senellart

Tilde's Parallel Corpus Filtering Methods for WMT 2018
Marcis Pinnis

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Nick Rossenbach, Jan Rosendahl, Yunsu Kim, Miguel Graça, Aman Gokrani and Hermann Ney

Prompsit's submission to WMT 2018 Parallel Corpus Filtering shared task
V́ctor M. Śnchez-Cartagena, Marta Bañón, Sergio Ortiz Rojas and Gema Raḿrez

NICT's Corpus Filtering Systems for the WMT18 Parallel Corpus Filtering Task
Rui Wang, Benjamin Marie, Masao Utiyama and Eiichiro Sumita

12:30–14:00 Lunch

14:00–15:30 Session 3: Invited Talk

14:00–15:30 Alexandra Birch (University of Edinburgh): Translation and the Media

15:30–16:00 Coffee Break

16:00–17:20 Session 8: Research Papers on Multilingual Translation

16:00–16:20 *Massively Parallel Cross-Lingual Learning in Low-Resource Target Language Translation*
Zhong Zhou, Matthias Sperber and Alexander Waibel

16:20–16:40 *Trivial Transfer Learning for Low-Resource Neural Machine Translation*
Tom Kocmi and Ondřej Bojar

16:40–17:00 *Input Combination Strategies for Multi-Source Transformer Decoder*
Jindřich Libovický, Jindřich Helcl and David Mareček

17:00–17:20 *Parameter Sharing Methods for Multilingual Self-Attentional Translation Models*
Devendra Sachan and Graham Neubig

Thursday, November 1, 2018 (continued)